

Innovation Throws Us

By Joshua Lederberg

COMMUNICATIONS engineering is the most sophisticated of the domains where scientific knowledge is translated into human benefit. The mass-produced home television receiver is as complex as the most abstruse laboratory instrument. No physical phenomenon has been overlooked in laboratory experimentation for the development of improved techniques of message transmission. The discrepancies between promise and reality evoke the most impatience precisely because the fundamental opportunities are so immense.

Compare, for example, the ever-improving elegance, comfort and economy of jet aircraft with the expense and personal discomfort of long distance audio communication.

To be sure, making a long distance phone call with only the shortest delay is still so impressive that this criticism may seem ingracious. However, the inadequacies of existing voice transmission, and absence of private video, so strain intricate communication (who has not been impelled to shout while using the phone?) that people prefer the indignities of shipping their bodies for thousands of miles to transact business of any real complexity.

In mitigation, no industry is more liable to premature technological obsolescence, so it must move cautiously. Capital investments in long lines of copper wire are hard to amortize in the face of competition from communication satellites, and these in turn stand considerable risk of being left high and dry with the perfection of laser techniques.

The entanglements are bound to spread into many subsidiary lines of decision on social policy. With great pain, we may learn how to cope with single innovations, but we are surely a long way from dealing effectively with the cumulative process of innovation and displacement.

Science and Man

In communications, where capital investment in a national system looms so large, we are therefore bound to see a much less flexible response than in aircraft, where operating expenses dominate. It might be possible, however, to disengage some elements of the communications industry, such as bulk transmission for large users, which might be most responsive to progress through competition, just as aircraft outdo the ground part of the air transport system.

This issue underlies the current debate about the authorization of domestic satellite facilities, either as part of COMSAT's franchise or as a separate system. Public interest in these issues has been sharpened by imaginative proposals from McGeorge Bundy of the Ford Foundation for a Broadcasters' Non-Profit Satellite (BNS) system.

Briefly, BNS would gain a monopoly to service commercial network TV. Its earnings would support educational TV over additional channels of the same system. Commercial broadcasters might bid to set up their own home-owned system at rates based on costs. The Federally authorized monopoly would amount to a tax equivalent of the difference between BNS costs and its rates, which would be left at current land-line standards.

BUNDY ARGUES, and the networks acquiesce, that the subsidy is only a small return on the previous national investment in satellite development. Recognizing the political appeal of such a tax, COMSAT has rebutted with a tentative proposal that it retain the rights to all domestic service, but levy a contribution for educational purposes from all users of advanced systems.

Many academics might be gleeful at the idea of a special tax on TV entertainment, which, based on mass advertising, tends to reduce information to the lowest common denominator. But is earmarking fundamentally a sound principle for the rational dispensation of priorities?

My delight might be short

lived were I able to arrange to support research in genetics with a tax on horse racing. Still, direct channels of support might be a good idea if BNS were thereby insulated from political pressure, but would it be so long as its lifeblood was a Federal monopoly?

Support for education might better be tied to the technical rather than the fiscal side of satellite transmissions. Basic research and education could be given the benefit of a differential rate structure, on any system.

The rates should be calculated to meet the incremental costs of these special services, rather than being prorated over the existing structure. Wherever such rate arrangements on new technology tended to facilitate more research and education, industry should be sympathetic. For example, enlightened computer manufacturers voluntarily offer educational discounts on their equipment, and might be inhibited as much by anti-trust problems as by conflicts of their commercial philanthropic motivations.

The whole concept of educational TV also needs a critical examination that should go deeper than the immediate enthusiasms. The Ford Foundation's proposal remarks that "The greatest assets of television are liveness and immediacy. Much of the vitality has been drained out of television with the increasing use of tape."

This may be true for the coverage of news events. But as an educator, I would be alarmed at the condemnation of libraries on the same principle. More attention should be paid to complementary technologies of videotape storage and easier dissemination, playback and critical review.

Immediacy is not that important and may even be detrimental for more serious educational communication. To this, there are special exceptions, unfortunately not even mentioned in the Ford Foundation proposal, such as wide band-width transmissions for technical conversation, library interchanges and especially the intercommunication of computers.